7 January, 2011 **Global Monitoring Division Hot Items**

Major Breakthrough by NOAA-led Team on Removal of Air Pollution

Global Monitoring Division - **ESRL-GMD**
This story entered on 6th Jan, 2011 01:00:00 PM PST

An international, NOAA-led research team has made a major breakthrough in understanding the atmosphere's ability to cleanse itself of air pollutants and some greenhouse gases. Earlier studies were inconclusive on how sensitive the hydroxyl (OH) radical that controls the self-cleaning power of the atmosphere was to environmental changes.

The new answer, in a paper to be published in *Science in the second week of January 2011, is that global atmospheric OH concentrations are fairly stable and robust.

Background: Previous studies suggested that global levels of OH, which help clear the atmosphere of many hazardous air pollutants and some important greenhouse gases, could rise and fall by up to 25-percent per year. Since OH has a lifetime of a second, it is extremely difficult to estimate its global mean concentration and annual variability. The NOAA led team took the approach of analyzing the past decade of global measurements of methyl chloroform, an ozone depleting gas controlled by the Montreal Protocol that reacts with OH. Because of the Protocol, emissions of methyl chloroform during this period had declined to the extent that a much more precise picture of global OH emerged.

Significance: "We now know that the atmosphere's ability to rid itself of many pollutants is generally well buffered," lead author Steve Montzka said. "This fundamental property of the atmosphere was one we hadn't been able to confirm before." Thus, the group's findings improve confidence in projecting the future of Earth's atmosphere. "Say we wanted to know how much we'd need to reduce human-derived emissions of methane to cut its climate influence by half," Montzka said. "That would require an understanding of hydroxyl and its variability. Since the new results suggest that large hydroxyl radical changes are unlikely, such projections become more reliable."

*Small Inter-Annual Variability of Global Atmospheric Hydroxyl, Steve Montzka, NOAA Global Monitoring Division; Maarten Krol (University of Utrecht and Wageningen University, Netherlands); Ed Dlugokencky and Bradley Hall (NOAA Global Monitoring Division); Patrick Jöckel (Max-Planck-Institute for Chemistry in Mainz, Germany and the Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany); and Jos Lelieveld (Max-Planck and the Cyprus Institute in Nicosia, Cyprus). Science, January 7, 2011.

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